L-Cysteine, effect on growth inhibition of Legionella species, 139

Cystofilobasidium, nucleotide sequence analysis of, 295

Daptomycin, Pseudomonas aeruginosa and Pasteurella multocida cell envelope impermeability to, 367

Dehydrogenase, release from Rhizobium leguminosarum bv phaseoli bacteroids by lysozyme, 169

2-Deoxyglucose, role in pool-labeling experiments showing transportassociated phosphorylation, 39

Diarrhea, Campylobacter jejuni inoculation and, 47

Dibenzothiophene, oxidation of by Cunninghamella elegans, 229

2,4-Dichlorophenoxyacetic acid-biodegrading bacteria, comparison of assay methods for, 95

N,N'-Dicyclohexycarbodiimide, study of copper uptake in cyanobacterium N. calcicola by application of, 33

Dipicolinate content, correlation with sporulation temperature and spore heat resistance in *B. subtilis* A, 75 DNA

obtained from rDNA by polymerase chain reaction (PCR) amplification, 325

plasmid, transformation into Staphylococcus aureus by electroporation, 373

DNA-DNA hybridization, study of genomic and phenotypic characterizations of *Pseudomonas alcaligenes* and *Comamonas* species, 279

DNA fragments
envC mutation complementing,
isolation of, 341

role in subcloning of bglS gene in E. coli, 267

DNase-deficient mutants, of Clostridium acetobutylicum, 307

Electron microscopy, of capsular polysialic acid in *E. coli* mutants, 23

Electroporation high-frequency transformation of Staphylococcus aureus by, 373 of pKK1 silver-resistant plasmid into

P. putida by, 103
Endotovemia, campylobacteriosis and

Endotoxemia, campylobacteriosis and, 47

Enterocolitis, vaccination against, 29
EnvC gene, of E. coli, molecular cloning of, 341

Escherichia coli

binding of spectinomycin to ribosomes and subunits of, 261 capsular sialyl chains of K1 phageresistant mutants of, 23 cloning and expression of Aeromonas hydrophila chitinase gene in, 329 effect of aldehydes on protein syn-

thesis in, 117 effect of interleuken-2 on cecal population levels of, 381

effects of sunlight and autochthonous microbiota on survival of, 65

genetic regulation of glycogen biosynthesis in, 131

glyoxylate inhibition of isocitrate lyase from, 313 induction of inhibitor of RecBCD enzyme in, 7

molecular cloning of envC gene of, 341 production of 51 and 42 kDa larvicidal proteins of Bacillus sphaericus in, 361

role in study of urinary tract infections, 59

rra mutation-mediated alleviation of Rgl restriction in, 1

secondary transpositions of Tn5 upon Tn5 mutagenesis in, 273

study of recombination peptide of Clostridium difficile toxin A, 29 subcloning of Bacillus subtilis β-1,3-1,4-glucanase gene in, 267

Estuarine environments, effect of light and autochthonous microbiota on bacteriaol survival in, 65

Ethylenediaminetetraacetate (EDTA), effect on outer membranes of Pseudomonas aeruginosa and Pasteurella multocida, 367

Eubacteria, in leaf cavities of A. mexicana, ultrastructural characterization of, 123

Euglena gracilis, motility and gravitactic orientation of, 161

 Eukaryotes, identification of species of by oligonucleotide sequences in, 295
 Exonuclease V, induction of inhibitor of, 7

Extracellular polar body, in cowpea rhizobia membrane, 243

Ferredoxin-NADP\* reductase (FNR), role in nitrate reduction to ammonia in P. uncinatum, 53

Ferrets, pathogenicity of Campylobacter jejuni in, 47

Formaldehyde, effect on protein synthesis in E. coli, 117

Freeze-etching electron microscopy, study of cowpea rhizobia structure by, 243

Gastrointestinal tract, Campylobacter jejuni colonization of, 47

Gel electrophoresis, sialyl chain length banding pattern in KI polysaccharide shown by, 23 Gene expression, in *E. coli*, effect of catabolite repression and stringent response systems in, 131

Gene probe, detection of 2,4-dichlorophenoxyacetic acid-biodegrading bacteria with, 95

Genetic mapping, rra mutations in E. coli. 1

Germinants, role in pH dependence of spore triggering, 349

Glucan synthase activity, role in cell wall assembly, 233

Glucose, role in triggering of Bacillus megaterium spores, 349

Glucose catabolism, role in nitrate metabolism by *Phormidium uncina*tum. 53

Glucose-6-phosphate dehydrogenase (G6PDH), role in nitrate reduction to ammonia in *P. uncinatum*, 53

Glutamic acid, effect on glutamine synthetase composition, 199

Glutamine, effect on glutamine synthetase composition, 199

Glutamine synthetases, in *Rhizobium*phaseoli, modulation of forms of, 199

Glutaraldehyde, effect on protein synthesis in E. coli, 117

Glycogen biosynthesis, in E. coli, genetic regulation of, 131

Glyoxylate, inhibition of isocitrate lyase from E. coli by, 313

Gram-negative bacilli, effect of interleuken-2 on cecal population levels of, 381

Gravitaxis, of Euglena gracilis, effect of artificial and solar UV-B radiation on, 161

Greening disease, purification of bacterium-like organism associated with, 175

Guanosine 5'-diphosphate 3'-diphosphate (ppGGpp), regulation of glg gene expression by, 131

Haloferax mediterranei, lethal and mutagenic effects of hydroxylamine on, 83

Halophilic archaebacteria, hydroxylamine mutagenesis of, 83

Hemolysin, effect of transposition of Tn5 into hlyA on, 273

Herbicide-resistance gene, expression in Synechocytis PCC6803, 283

Heterotrophic plate count bacteria, Legionella growth inhibition by, 139

Heterotrophy, nitrate metabolism in Phormidium uncinatum and, 53

hha gene, of E. coli, effect of Tn5 insertions on, 273

High-affinity glucose transport, phosphorylation of sugar in yeast mutants lacking, 39 L-Cysteine, effect on growth inhibition of Legionella species, 139

Cystofilobasidium, nucleotide sequence analysis of, 295

Daptomycin, Pseudomonas aeruginosa and Pasteurella multocida cell envelope impermeability to, 367

Dehydrogenase, release from Rhizobium leguminosarum bv phaseoli bacteroids by lysozyme, 169

2-Deoxyglucose, role in pool-labeling experiments showing transportassociated phosphorylation, 39

Diarrhea, Campylobacter jejuni inoculation and, 47

Dibenzothiophene, oxidation of by Cunninghamella elegans, 229

2,4-Dichlorophenoxyacetic acid-biodegrading bacteria, comparison of assay methods for, 95

N,N'-Dicyclohexycarbodiimide, study of copper uptake in cyanobacterium N. calcicola by application of, 33

Dipicolinate content, correlation with sporulation temperature and spore heat resistance in *B. subtilis* A, 75 DNA

obtained from rDNA by polymerase chain reaction (PCR) amplification, 325

plasmid, transformation into Staphylococcus aureus by electroporation, 373

DNA-DNA hybridization, study of genomic and phenotypic characterizations of *Pseudomonas alcaligenes* and *Comamonas* species, 279

DNA fragments
envC mutation complementing,
isolation of, 341

role in subcloning of bglS gene in E. coli, 267

DNase-deficient mutants, of Clostridium acetobutylicum, 307

Electron microscopy, of capsular polysialic acid in *E. coli* mutants, 23

Electroporation high-frequency transformation of Staphylococcus aureus by, 373 of pKK1 silver-resistant plasmid into

P. putida by, 103
Endotovemia, campylobacteriosis and

Endotoxemia, campylobacteriosis and, 47

Enterocolitis, vaccination against, 29
EnvC gene, of E. coli, molecular cloning of, 341

Escherichia coli

binding of spectinomycin to ribosomes and subunits of, 261 capsular sialyl chains of K1 phageresistant mutants of, 23 cloning and expression of Aeromonas hydrophila chitinase gene in, 329 effect of aldehydes on protein syn-

thesis in, 117 effect of interleuken-2 on cecal population levels of, 381

effects of sunlight and autochthonous microbiota on survival of, 65

genetic regulation of glycogen biosynthesis in, 131

glyoxylate inhibition of isocitrate lyase from, 313 induction of inhibitor of RecBCD enzyme in, 7

molecular cloning of envC gene of, 341 production of 51 and 42 kDa larvicidal proteins of Bacillus sphaericus in, 361

role in study of urinary tract infections, 59

rra mutation-mediated alleviation of Rgl restriction in, 1

secondary transpositions of Tn5 upon Tn5 mutagenesis in, 273

study of recombination peptide of Clostridium difficile toxin A, 29 subcloning of Bacillus subtilis β-1,3-1,4-glucanase gene in, 267

Estuarine environments, effect of light and autochthonous microbiota on bacteriaol survival in, 65

Ethylenediaminetetraacetate (EDTA), effect on outer membranes of Pseudomonas aeruginosa and Pasteurella multocida, 367

Eubacteria, in leaf cavities of A. mexicana, ultrastructural characterization of, 123

Euglena gracilis, motility and gravitactic orientation of, 161

 Eukaryotes, identification of species of by oligonucleotide sequences in, 295
 Exonuclease V, induction of inhibitor of, 7

Extracellular polar body, in cowpea rhizobia membrane, 243

Ferredoxin-NADP\* reductase (FNR), role in nitrate reduction to ammonia in P. uncinatum, 53

Ferrets, pathogenicity of Campylobacter jejuni in, 47

Formaldehyde, effect on protein synthesis in E. coli, 117

Freeze-etching electron microscopy, study of cowpea rhizobia structure by, 243

Gastrointestinal tract, Campylobacter jejuni colonization of, 47

Gel electrophoresis, sialyl chain length banding pattern in KI polysaccharide shown by, 23 Gene expression, in *E. coli*, effect of catabolite repression and stringent response systems in, 131

Gene probe, detection of 2,4-dichlorophenoxyacetic acid-biodegrading bacteria with, 95

Genetic mapping, rra mutations in E. coli. 1

Germinants, role in pH dependence of spore triggering, 349

Glucan synthase activity, role in cell wall assembly, 233

Glucose, role in triggering of Bacillus megaterium spores, 349

Glucose catabolism, role in nitrate metabolism by *Phormidium uncina*tum. 53

Glucose-6-phosphate dehydrogenase (G6PDH), role in nitrate reduction to ammonia in *P. uncinatum*, 53

Glutamic acid, effect on glutamine synthetase composition, 199

Glutamine, effect on glutamine synthetase composition, 199

Glutamine synthetases, in *Rhizobium*phaseoli, modulation of forms of, 199

Glutaraldehyde, effect on protein synthesis in E. coli, 117

Glycogen biosynthesis, in E. coli, genetic regulation of, 131

Glyoxylate, inhibition of isocitrate lyase from E. coli by, 313

Gram-negative bacilli, effect of interleuken-2 on cecal population levels of, 381

Gravitaxis, of Euglena gracilis, effect of artificial and solar UV-B radiation on, 161

Greening disease, purification of bacterium-like organism associated with, 175

Guanosine 5'-diphosphate 3'-diphosphate (ppGGpp), regulation of glg gene expression by, 131

Haloferax mediterranei, lethal and mutagenic effects of hydroxylamine on, 83

Halophilic archaebacteria, hydroxylamine mutagenesis of, 83

Hemolysin, effect of transposition of Tn5 into hlyA on, 273

Herbicide-resistance gene, expression in Synechocytis PCC6803, 283

Heterotrophic plate count bacteria, Legionella growth inhibition by, 139

Heterotrophy, nitrate metabolism in Phormidium uncinatum and, 53

hha gene, of E. coli, effect of Tn5 insertions on, 273

High-affinity glucose transport, phosphorylation of sugar in yeast mutants lacking, 39 HMC-DNA, rra mutation-mediated alleviation of Rgl restriction of, I Homothallic species, nucleotide se-

quence analysis of, 295

Hybridoma cells, monoclonal antibodies against *A. tumefaciens* strain C58 produced by, 181

Hydroxylamine, mutagenesis of Haloferax mediterranei by, 83

Immunoaffinity chromatography, purification of bacterium-like organism associated with greening disease of citrius by, 175

Inhibitor protein, of exonuclease V, induction of, 7

Interleuken-2, recombinant, alteration of intestinal microbial ecology in mice by, 381

Intestinal brush border dysfunction, role in *Campylobacter jejuni* diarrhea, 355

Intestinal microbial ecology, in mice, effect of recombinant interleuken-2 on, 381

Isocitrate lyase, from E. coli, glyoxylate inhibition of, 313

Kanamycin nucleotidyltransferase, in plasmid, effect on transformation of Bacillus stearothermophilus, 301

Lactose activity, effect of Campylobacter jejuni diarhhea on, 355

Lactobacilli, susceptibility to nonoxynol-9, 219

Lectin, role in *Rhizobium*-legume symbiosis, 243

Legionella, growth inhibition by heterotrophic plate count bacteria, 139

Leucosporidium, nucleotide sequence analysis of, 295

lexA mutants, induction of RecBCD enzyme inhibitor in, 7

Light, role in copper uptake in cyanobacterium Nostoc calcicola, 33

Lipomyces species, ribosomal RNA sequence comparisons of, 387

Lipopolysaccharides

binding with Polymyxin B as basis for assay, 91

of Campylobacter jejuni, biochemical characterization of, 377

Lyophilized cell cultures, polymerase chain reaction amplification of 16S rDNA from 325

Lysozyme, release of periplasmic enzymes from Rhizobium leguminosarum by phaseoli bacteroids after treatment by, 169

Maltase activity, effect of Campylobacter jejuni diarrhea on, 355 Mating studies, with bacterial cultures and bacteria from soil, 151

Messenger RNA, role in binding of spectinomycin by ribosomes and subunits of *E. coli*, 261

Methanococcus thermolithotrophicus, nitrate as sole nitrogen source for, 193

Methanogenic bacteria, effect of nitrate on growth of, 193

L-Methionine DL-sulfoximine (MSX), effect on glutamine synthetase composition. 199

Microbiota, indigenous, effect on E. coli survival in estuarine environment. 65

Mitomycin C, induction of promoter of RecBCD enzyme inhibitor by, 7

Molecular systematics, role of polymerase chain reaction amplification in study of, 325

Molybdenum, growth of Methanococcus thermolithotrophicus dependent on, 193

Monoclonal antibodies, against Agrobacterium tumefaciens strain C58, 181

Monoclonal antibodies, purification of bacterium-like organism associated with greening disease of citrus by, 175

Mosquitocidal-protein genes, of Bacillus thuringiensis subsp. israelensis, expression in Synechocytis PCC6803, 283

Most-probable-number, radiolabel, study of 2,4-dichlorophenoxyacetic acid-biodegrading bacteria with, 95

Motility, of Euglena gracilis, effect of ultraviolet radiation on, 161

Mutagenesis, of halophilic archaebacteria by hydroxylamine, 83

Mutants

copper-resistant, of Aspergillus nidulans, 255

of Bacillus subtilis, heat resistance of spores and vegetative cells from, 249

envC gene of E. coli, cloning of DNA fragment complementing, 341

temperature-sensitive, role in study of cell wall assembly, 233

Myxozyma species, ribosomal RNA sequence comparisons of, 387

NADPH-glutamate dehydrogenase (GDH) activity, assimilation of ammonia in P. uncinatum by, 53

Natural waters, study of 2,4-dichlorophenoxyacetic acid-biodegrading bacteria in, 95

Neocallimastix frontalis EB188, regulation of protein and cellulase excretion in, 109 Neurospora crassa cell wall assembly of, 233 cell wall-less mutants of, 233 Nitrate

effect on growth of methanogenic bacteria, 193

sole nitrogen source for Methanococcus thermolithotrophicus, 193

Nitrate metabolism, in *Phormidium* uncinatum under heterotrophic conditions, 53

Nitrogen-fixing compounds, effect on forms of glutamine synthetases in Rhizobium phaseoli, 199

Nonoxynol-9, effect on growth and adhesion of urogenital bacteria, 219 Nostoc calcicola, copper uptake in, 33 Nucleotide sequence analysis, identification of species of basidiomycetous

veasts by, 295

Outer membrane proteins (OMP), of colonizing and noncolonizing strains of Campylobacter jejuni, 17

Pasteurella multocida, cell envelope impermeability to daptomycin, 367 Peanut agglutinin, effect on structure of

cowpea rhizobia, 243
Peptidoglycan layer, of R. l. by phaseoli, effect of low pH on susceptibility to hydrolysis, 169

Periplasmic enzymes, release from bacteroids by lysozyme, 169 pH

effect on DNase activity in Clostridium acetobutylicum, 307

role in release of periplasmic enzymes from bacteroids by lysozyme, 169

triggering of Bacillus megaterium spores dependent on, 349

Phormidium uncinatum, heterotrophy and nitrate metabolism in, 53

Phosphatidylcholine, phospholipid in Bradyrhizobium spp., 205

Phosphatidylethanolamine, phospholipid in *Bradyrhizobrium* spp., 205

Phosphatidylglycerol, phospholipid in Bradyrhizobium spp., 205

Phosphinothricin acetyltransferase (PAT), encoded by herbicide-resistance bar gene in Synechocytis PCC6803, 283

Phosphodiesterase, release from Rhizobium leguminosarum bv phaseoli bacteroids by lysozyme, 169

6-Phosphogluconate dehydrogenase (6PGDH), role in nitrate reduction to ammonia in *P. uncinatum*, 53

Phospholipid composition, of *Bradyrhi*zobium spp., 205 Phosphorylation, transport-associated, in yeast mutants, 39

Plasmid pKK1, silver-resistant, electroporation into Pseudomonas putida CYM318, 103

Plasmid transfer, effect of bacterial mating on selective agar plates on, 151

#### **Plasmids**

high and low copy number, role in envC complementation, 341 location of chitinase gene on, 329

recombinant, role in transformation efficiency of *Bacillus stearother-mophilus*, 301

role in subcloning of *Bacillus subtilis* β-1,3-1,4-glucanase gene in *E. coli*, 267

transformation into Staphylococcus aureus by electroporation, 373

Polar periplasmic bay, as characteristic feature of cowpea rhizobia, 243

Polyacrylamide gel electrophoresis methods

characterization of protein excretion patterns in ruminal fungus by, 109 study of arginine aminopeptidase activity by, 145

study of protein expression in E. coli exposed to aldehydes, 117

Polyamines, effect on polyphenylalanines synthesis in cell-free extracts, 211

Polyinosinic acid, role in binding of spectinomycin by ribosomes and subunits of E. coli, 261

Polymerase chain reaction (PCR) amplification, role in 16S rDNA sequencing and studies of molecular systematics, 325

### Polymyxin B

effect on outer membranes of Pseudomonas aeruginosa and Pasteurella multocida, 367 role in assay for bacterial lipopolysaccharides, 91

Polyphenylalanine synthesis, in cellfree extracts of *B. subtilis* and thermophilic mutant, 211

mophilic mutant, 211
Polysaccharides, role in molecular
recognition of cowpea rhizobia by
peanut lectin, 243

Pool-labeling experiments, study of transport-associated phosphorylation of sugar by, 39

Protein separation methods, study of extracellular protein excretion by, 109

Protein synthesis, in E. coli, effect of glutaraldehyde and formaldehyde on,

### Proteins

42 and 51 kDa, of Bacillus sphaericus, larvicidal properties of, 361 regulation of excretion in ruminal fungus N. frontalis, 109

Proteolysis, during sporulation, effect of actinomycin D on, 289

psbA promoter, from tobacco chloroplast genome, controller of Bti and bar genes in Synechocytis PCC6803, 283

Pseudomonas aeruginosa, cell envelope impermeability to daptomycin, 367

Pseudomonas alcaligenes, genomic and phenotypic characterizations of, 279

Pseudomonas putida CYM318, electroporation of pKK1 silver-resistant plasmid into, 103

Pseudomonas stutzeri AG259, pKK1 silver-resistant plasmid from, 103

Pyelonephritis, role of terminal carbohydrate residues in urinary tract epithelium for establishment of, 59

Pyrophosphatase, release from Rhizobium leguminosarum by phaseoli bacteroids by lysozyme, 169

Recombinant peptide, of Clostridium difficile toxin A, 29

Rgl restriction, role of *rra* mutation in *E. coli* in alleviation of, 1

Rhizobium leguminosarum by phaseoli bacteroids, release of periplasmic enzymes from, 169

Rhizobium phaseoli, modulation of different forms of glutamine synthetases in, 199

Rhodosporidium, nucleotide sequence analysis of, 295

Ribosomal DNA, from lyophilized cell cultures, polymerase chain reaction amplification of, 325

# Ribosomal RNA

large subunit, nucleotide sequence analysis of, 295

of Lipomyces and Myxozyma species, sequence comparisons of, 387

Ribosomes, of *Escherichia coli*, binding of spectinomycin to, 261

RNA synthesis, role in protein catabolism during sporulation, 289

rra mutants, genetic location and role in Rgl restriction alleviation, 1

Ruminal fungus, regulation of protein and cellulase excretion in, 109

Saccharomyces cerevisiae, transportassociated phosphorylation of sugar in, 39

SDS-PAGE, study of Campylobacter jejuni congenic pairs by, 17

### Sepharose

bound to Polymyxin B, lipopolysaccharide-binding capacity determined by, 91 role in purification of greening organism by immunoaffinity chromatography, 175

Sequencing, role of polymerase chain reaction amplification in, 325

Siliac acid, phenotype of K1 phageresistant *Escherichia coli* mutants and content of, 23

Silver ion-sensitive *Pseudomonas* putida strain, electroporation of pKK1 plasmid into, 103

SOS functions, lexA-indepenent, role in induction of exi gene, 7

Spectinomycin, binding to ribosomes and subunits of *Escherichia coli*, 261 Spermidine, effect on cell-free extracts

of thermophilic mutant, 211 Spirochaeta aurantia, negative chemo-

taxis in, 187
Spore heat resistance, correlation with

sporulation temperature in B. subtilis A, 75

Spores, of Bacillus subtilis, heat-killing resistance of, 249

Sporidiobolus, nucleotide sequence analysis of, 295

## Sporulation

heat shock protein synthesis in Bacillus subtilis strains during, 249

of Bacillus megaterium, effect of actinomycin D on protein degradation during, 289

Sporulation temperature, correlation with spore heat resistance in *B. subtilis* A, 75

Staphylococci, effect of interleuken-2 on cecal population levels of, 381

Staphylococcus aureus, transformation of plasmid DNA into by electroporation, 373

Streptococci, effect of interleuken-2 on cecal population levels of, 381

Streptococcus sanguis cobalt-activated aminopeptidase

from, 317 membrane-associated arginine aminopeptidase in, 145

Stringent response systems, effect on glg gene expression in E. coli, 131

Subcloning, of B. subtilis  $\beta$ -1,3-1,4glucanase gene in E. coli, 267

Succinate, coupled enzymatic assay for, 313

Sucrase activity, effect of Campylobacter jejuni diarrhea on, 355

Sugar, transport-associated phosphorylation of, 39

Sunlight, effect on E. coli survival in estaurine environment, 65

Synechocytis PCC6803, gene expression in, 283

Temperature-sensitive mutants, role in study of cell wall assembly, 233 Theophylline stimulation, of jejunal mucosal ion transport, effect of Campylobacter jejuni diarrhea on, 355

Thermophiles, use of kanamycin nucleotidyltransferase mutant as marker for cloning vectors in, 301

Thermophilic mutant, of *Bacillus subti*lis, properties of cell-free extracts from, 211

Thermotolerance, in *Bacillus subtilis* and transposon-generated mutant strain, 249

TK101 gene, role in cloning vectors in thermophiles, 301

Tn5, secondary transpositions in Escherichia coli of, 273 Transconjugant-selective plates, bacterial mating on, 151

Transmission electron microscopy, study of eubacteria in Azolla mexicana leaf cavities, 123

Transposon mutagenesis, in E. coli, secondary transpositions of Tn5 upon, 273

Tungsten, growth of Methanococcus thermolithotrophicus dependent on,

Ultraviolet radiation, artificial and solar, effect on gravitactic orientation of *E. gracilis*, 161

Urinary tract epithelium, terminal αDgal(1-4)βDgal residues in, 59 Urinary tract infection, role of nonoxynol-9 in, 219

Uropathogenic bacteria, susceptibility to nonoxynol-9, 219

Vegetative cells, of Bacillus subtilis, heat-killing resistance of, 249

Western blot analysis, study of Campylobacter jejuni congenic pairs by, 17

Yeast mutants (snf3), lacking highaffinity glucose transport, transportassociated phosphorylation of sugar in, 39